

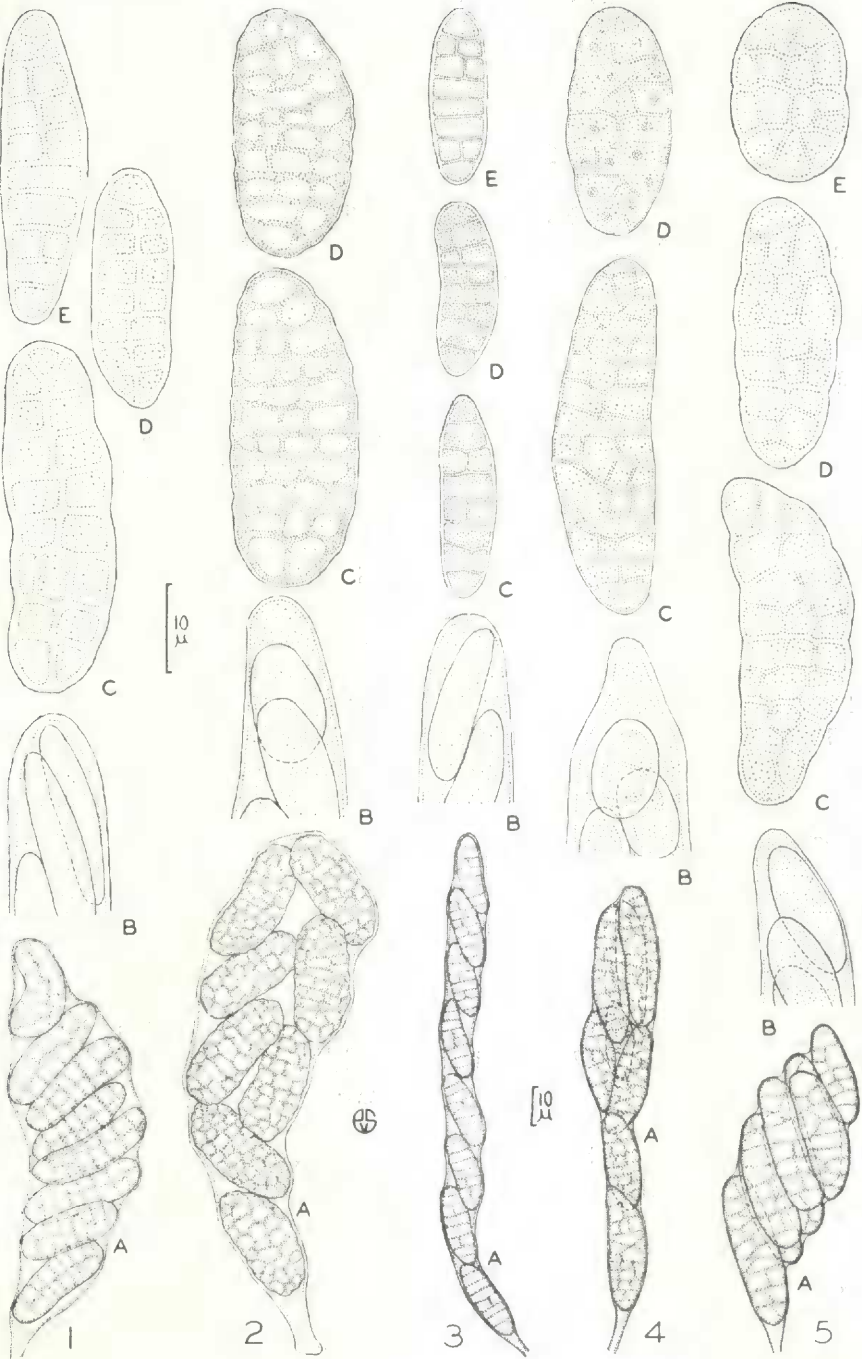
Seeler, from Seeler no. 418. FIG. 11. *T. austro-americana* (Speg.) Seeler. Perithecial stroma, from Seeler's collection of 1936 on *Gleditsia*. FIG. 12. *T. Lamyi* (Desmz.) Seeler. Perithecial stroma. Bark of host twig has been cut away on both sides to afford a clearer view. From Univ. Toronto Herb. no. 4167 on *Berberis*.

PLATE 5.

Photographs of illustrations from the literature.

- Fig. 1. *Thyronectria patavina* Saccardo, the genus type. From a drawing by P. A. Saccardo in *Fungi Italici Autographice Delineati*, Plate 153, 1877. Note: perithecia are only partially embedded and not truly valloid.
- Fig. 2. *Mattirolia rosco-virens* Berlese & Bresadola. From a drawing by A. N. Berlese in *Mycromyces Tridentini*, Plate 5, fig. 3, 1889.
- Fig. 3. *Mattirolia rhodochlora* (Mont.) Berlese. From a drawing by A. N. Berlese in *Atti de Congresso Botanico Internazionale di Genova* 1892, Plate 22, fig. 4 and 5. 1893.
- Fig. 4. *Placonectria berolinensis* Saccardo. From a drawing by H. W. Wollenweber in Sorauer's *Handbuch der Pflanzenkrankheiten* (5 ed.) 2 (1), Plate 160, p. 571, 1928. Note the *Dendrodochium* conidial phase at the top.
- Fig. 5. *Placonectria pseudotrichia* (Schw.) Wollenweber. Note the *Stilbella* conidiospores at the top. From same source as Fig. 4.

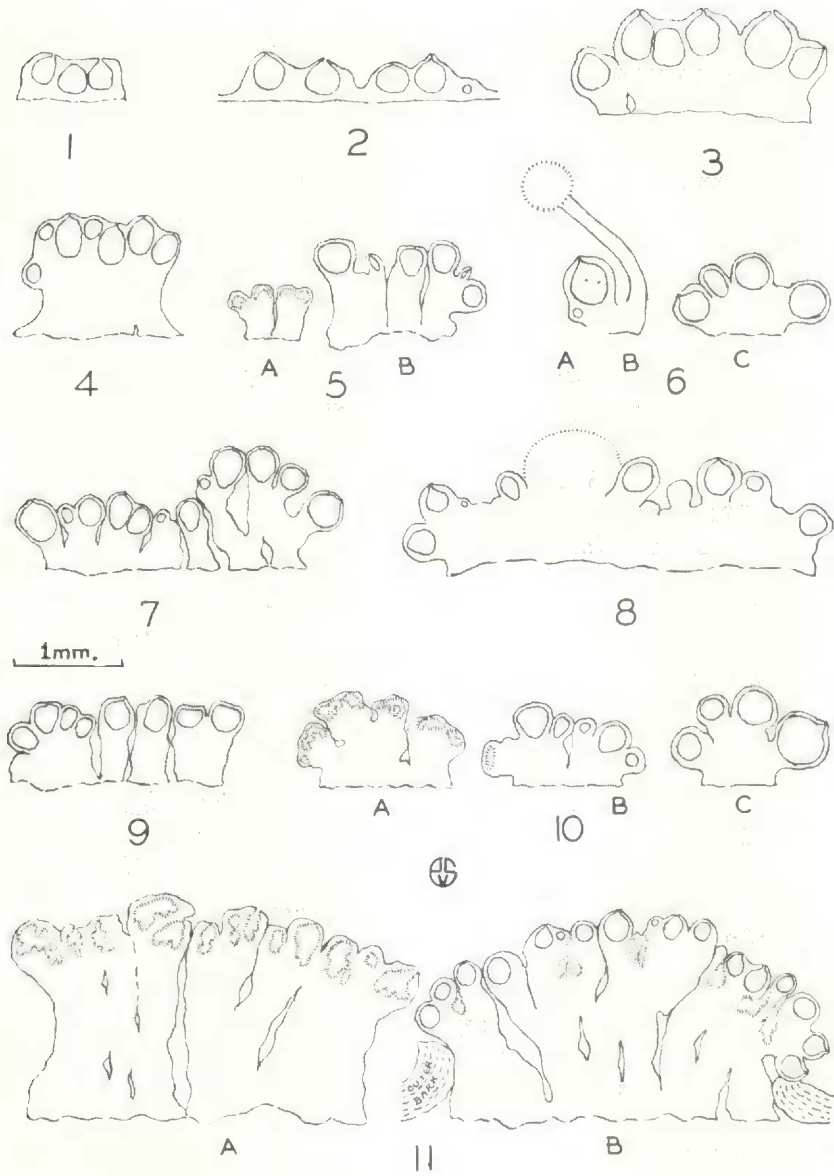
LABORATORY OF FOREST PATHOLOGY,
ARNOLD ARBORETUM,
HARVARD UNIVERSITY.



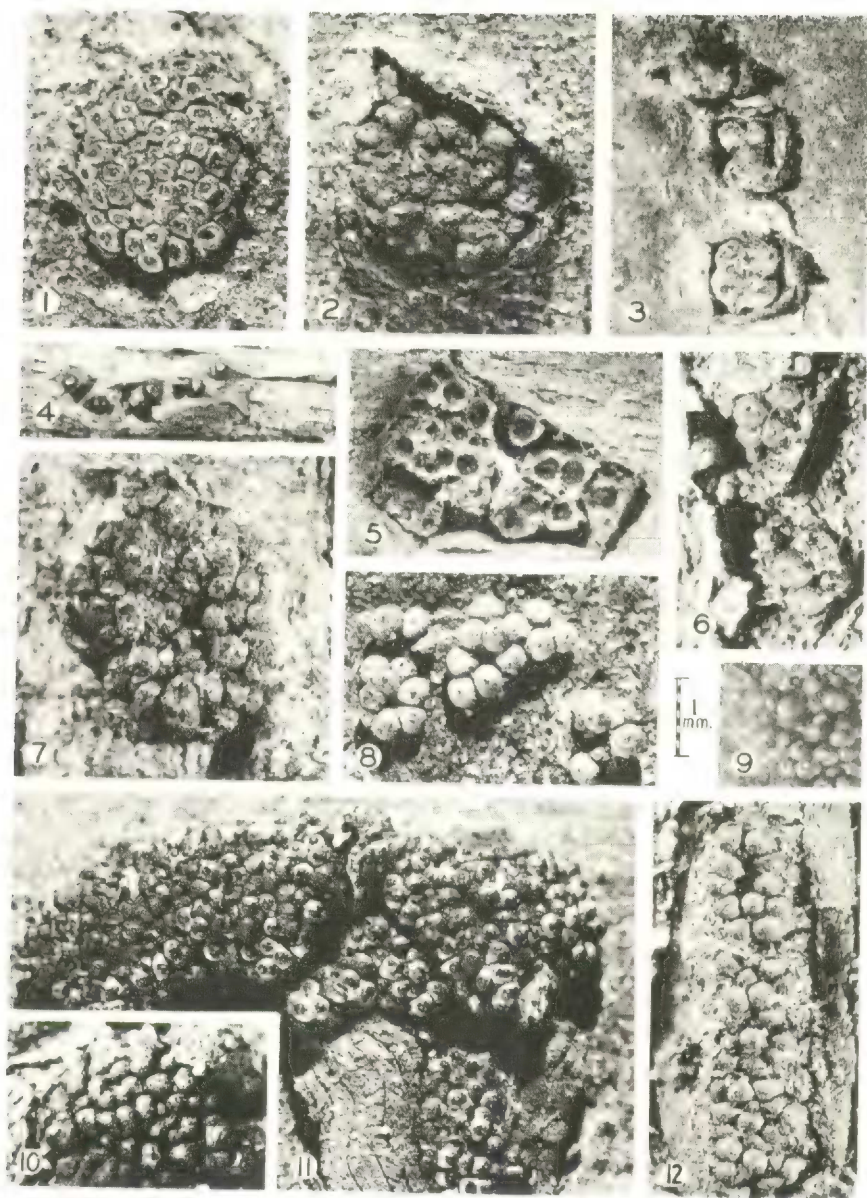
THYRONECTRIA



THYRONECTRIA

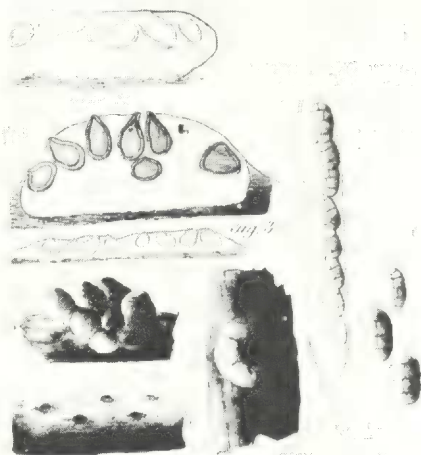
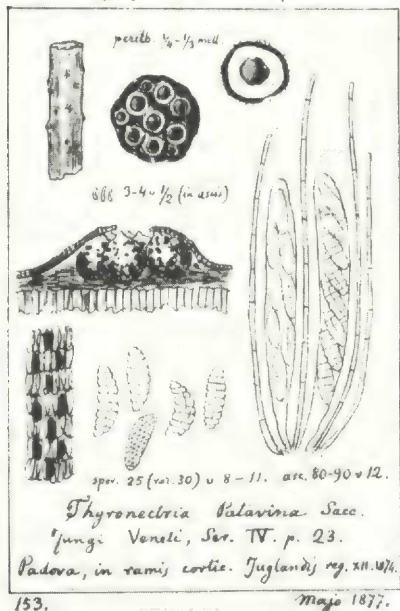


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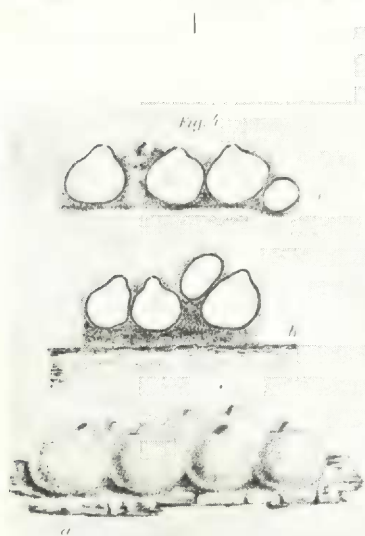


THYRONECTRIA

Saccardo, *Fungi Italici - Hypocreaceae.*



2



Thyronectria balarina

3



Fig. 1



Pleonectria berolinensis

4



Pleonectria pseudotrichia

5

THYRONECTRIA

STUDIES OF THE ICACINACEAE, I PRELIMINARY TAXONOMIC NOTES

RICHARD A. HOWARD

With four plates

MORPHOLOGICAL STUDIES of the Icacinaceae are now in progress. These include studies of the wood and twig anatomy, nodal structure, pollen grain variations, as well as the leaf and flower structure. In the present paper I have presented some taxonomic notes required for the proper presentation of some of the anatomical findings which will be published in a following paper.

A taxonomic treatment of this family has long been desirable, since the only comprehensive survey is Valetton's *Critisch Overzicht der Olacineae* published 54 years ago in 1886. Valetton, agreeing with Bentham and Hooker, treated the Icacinaceae as part of the Olacaceae although Miers had pointed out many years before that these families should be separated. A. Engler prepared the revision for the *Natürlichen Pflanzenfamilien* in 1893. Since that date little has been published on the family. The present paper is one preliminary to a monographic study of the family.

The author is grateful for specimens generously loaned by the curators of the following herbaria. Arnold Arboretum, Harvard University (A), Field Museum, Chicago (FM), Gray Herbarium, Harvard University (G), New York Botanical Garden (NY), University of California (UC), U. S. National Museum, Washington, D. C. (US).

STEMONURUS BLUME

Stemonurus Blume, *Bijdr. Flor. Nederl. Indie* **13**: 648. 1825, as to generic description; Miers, *Ann. Mag. Nat. Hist.* ser. II, **10**: 30. 1852, in part; Miers, *Contrib.* **1**: 80. 1851-61, in part; O. Kuntze, *Rev. Gen.* **2**: 112. 1891; Engler, *Nat. Pflanzenfam.* III, **5**: 249. 1893.

Gomphandra Wallich in Roxburgh, *Fl. Ind.* **2**: 329. 1824, nom., Num. List, no. 3718 (1830), no. 7204 (1832) nom., Wallich ex Lindl. *Nat. Syst.* ed. 2, 439. 1836; Benth. & Hook. *Gen. Pl.* **1**: 350. 1862; Val. Crit. *Overz. Olac.* 207. 1886.

Lasianthera sensu Miq. Fl. Ind. Bat. 1¹: 790. 1856, in part; sensu Baillon, Hist. Pl. 5: 329. 1872, in part; sensu Becc. Mal. 1: 109. 1877, in part; not Beauv.

Flowers dioecious or possibly polygamous (?), 5- or 4-parted. Calyx short-campanulate, lightly dentate to almost entire. Petals 5 or 4 forming a confluent tube, apices valvate, with inflexed appendages, after anthesis reflexed. Stamens 5 or 4 with filaments fleshy and broad, at the top internally with cavities in which rest the anther sacs, on the shoulder behind the anther sacs and in front and below them, bearing a clavate or barbate pubescence, rarely glabrous, pubescence in the male flowers always exerted after anthesis but included in the female flowers; the anther sacs diverge at the base; stamens hypogynous and free from the petals. In the female flowers the stamens are shorter than the pistil and are sterile. The pistil in the male flowers is small cylindrical to conical and bears an almost obsolete disk at its base, this inferior portion is always solid but the upper portion which is abruptly attenuated may have a single locule with two rudimentary ovules. In the female flowers the pistil is cylindrical to obovate with a glandular, broad, lobed ring at the top, in the sunken center of which is the stigma. The single locule has two pendulous ovules. The disk is absent in the female flowers.

The fruit is a drupe, ellipsoid or oblong to obovoid with a pulviniform, umbilicate, stigmatic, glandular ring persisting, more or less eccentric, the mesocarp is fleshy but evanescent, the putamen is woody and occasionally slightly convex on one side with longitudinal ribs. The single seed is pendulous with a raphe which travels around the fleshy, sub-bipartite albumen. The embryo is minute and located at the apex of the albumen. The cotyledons are about equal to the length of the radicle.

Trees or shrubs, subglabrous to pubescent, taking various forms. The leaves are alternate, entire, petiolate, exstipulate, subcoriaceous and highly polymorphic. The dioecious flowers are small, articulated in 2-3-chotomized cymes which are few-flowered in the female and with more flowers in the male. The inflorescences are axillary to extra-axillary bearing minute bracts.

TYPE SPECIES: *Stemonurus javanicus* Blume.

DISTRIBUTION: Malaysia to India to the Philippines.

URANDRA THWAITES

Urandra Thwaites, Hook. Kew Jour. Bot. 7: 211. 1855; O. Kuntze, Rev. Gen. 2: 113. 1891; Engler, Nat. Pflanzenfam. III. 5: 248. 1893.

Stemonurus Blume, Bijdr. Flor. Nederl. Indie **13**: 648. 1825, in part, excluding the type; Blume, Mus. Bot. Lugd.-Bat. **1**: 249. 1849, in part; Miers, Ann. Mag. Nat. Hist. ser. II, **10**: 30. 1852, in part; Miers, Contrib. **1**: 80. 1851-61, in part; sensu Val. Crit. Overz. Olac. 230. 1886; not Blume (1825).

Lasianthera sensu Miq. Fl. Ind. Bat. **1**¹: 790. 1856, in part; sensu Baillon Hist. Pl. **5**: 329. 1872, in part; not Beauv.

Flowers hermaphroditic. Calyx small, campanulate, 5-toothed or -lobed, persistent. Petals 5, rarely 4, agglutinated into a tube with the sutures evident, apices inflexed, valvate, mid-rib or petal scarcely developed, commonly with vertical lines of dark stained cells, oblong, acuminate.

Stamens 5 rarely 4, hypogynous, alternate with the petals and free from them; filaments fleshy, flattened, at the apex on the dorsal side clothed with long clavate or pilose hairs which are long before aestivation and folded over the top of the stamen, after anthesis these are erect or reflexed, adaxial and below the anthers barbate-pubescent or glabrate, the hairs commonly lanceolate rather than clavate; anther sacs oblong, diverging at the base, erect and adnate by the apex to the top of the connective, dehiscent by a longitudinal slit.

The pistil is ovoid tapering to a conical apex and terminating in a punctiform stigma, surrounded at the base of the ovary by a membranaceous skirt, ovules two, pendant from the apex of the single loculus. Funiculus short.

The drupe is of two colors, usually dark purple below and a lighter color above, ovoid to oblong attenuate at both ends; one-seeded; the mesocarp is fibrous, the putamen almost woody. The seed is pendulous. The minute embryo is in the apex of the fleshy two-parted albumen, the cotyledons usually are much shorter than the radicle.

Trees to shrubs, glabrous, the leaves alternate, simple, entire, exstipulate, coriaceous and thicker than most of the Icacinaceae, pinnately veined. The flowers are articulated, in heads or placed in secund spikes which are umbellate and peduncled. The inflorescences are axillary.

TYPE SPECIES: *Urandra secundiflora* (Bl.) O. Ktze.

DISTRIBUTION: India, Ceylon, Java, Sumatra, Malay, Borneo, New Guinea and the Philippines.

KEY TO STEMONURUS, URANDRA, AND SOME RELATED GENERA

Flowers perfect.

Pistil ovoid, contracted above the middle to a conical apex, terminating in a punctate stigma, at the base completely surrounded with a membranaceous skirt; fruit narrow-oblong, tapering at each end; leaves thick and coriaceous. Species about 15. Pl. I, figs. 1-6... *Urandra*.

Pistil asymmetrical, at the base developing a fleshy lobe; fruit curved asymmetrical bearing a fleshy appendage on the concave side and on the convex side longitudinally striated in drying.

Petals united, confluent; inflorescence opposing the leaves; leaves membranaceous; filaments with a hairy internal flap. African. Species 1. Pl. I, figs. 16-22. *Lasianthera*.

Petals free, or agglutinized at the edges with the sutures evident; inflorescence axillary; leaves thick coriaceous; filaments without the flap but hairy below the anthers inside. New Caledonia. Species 1. Pl. I, figs. 23-28. *Gastrolepis*.

Pistil cylindrical or obovoid, without a skirt or appendage at the base; capped by a large fleshy glandular ring of tissue bearing the stigma sunken in its center; petals free; leaves coriaceous. Malay Peninsula. Species 1. Pl. II, figs. 1-7. *Cantleya*.

Flowers functionally unisexual; pistil rudimentary in staminate flowers.

Petals free or at most agglutinized with the sutures manifest; pistil in female flowers asymmetrical, below the middle on the concave side with a fleshy gibbosity which is not free; stigma large and more or less conical; fruit asymmetrical with a large fleshy lateral appendage on the concave side. Species 6. Pl. II, figs. 8-15. *Medusanthera*.

Petals forming a tube, confluent, sutures not evident at the middle.

Anthers introrsely dehiscent, filaments longer than the anthers; corolla developed in the pistillate flowers, corolla-tube elongate 2-3 times the length of its lobes; leaves glabrous or with a simple pubescence.

Filaments usually 3-5 times as long as the anthers, fused to the corolla tube; fruit usually globular with a smooth apex and ruminated endosperm. Species 23. Pl. II, figs. 16-20. *Gonocaryum*.

Filaments usually 2-3 times as long as the anthers, free from the corolla tube; fruit usually ovoid to cylindrical and capped by the persistent stigmatic ring, seed with normal endosperm; raphe elongate, encircling the seed. Over 60 species described. Pl. I, figs. 7-15. *Stemonurus*.

Anthers extrorsely dehiscent, filaments scarcely as long as the anthers; corolla reduced in pistillate flowers, corolla-tube very short, one-third to one-half the length of its lobes; leaves and the rest of the plant stellate pubescent; fruit cylindrical with normal endosperm. Species 8. Pl. II, figs. 21-27. *Platea*.

The name *Stemonurus* has been applied to two distinct genera. Blume created the name *Stemonurus* in 1825 in his *Bijdragen Flora Nederlandsch Indie* (13: 648) to apply to a group of plants now known to consist of three distinct genera. In 1849 (*Mus. Bot. Lugd.-Bat.* 1: 249-50) Blume recognized part of this confusion when he removed one of his previously described species from the generic concept, established

it as *Anacolosa*, a new genus of the Olacaceae, and published a new generic description for his emended *Stemonurus*. Unfortunately for the succeeding taxonomists his second description does not agree with his first. A plate (XLV) accompanied the second description and together these form the source of the confusion regarding the name *Stemonurus*. Valeton (Crit. Overz. Olac. 231. 1886) and Koorders and Valeton (Boomsoort. Java 5: 145. 1900) have accepted the second publication and the plate as the plant Blume meant to be covered by the name *Stemonurus* (cf. Val. Icon. Bog. 1: 40. 1901). Kuntze (Rev. Gen. 2: 112. 1891), Engler (Nat. Pflanzenfam. III. 5: 247. 1893) and others have employed the original 1825 description and applied the name to the plant indicated there.

The plants described in Blume's two diagnoses may be distinguished by the pistil and the fruits. The perianth and the stamens were not adequately described by Blume. There are supplementary characters available in the leaves and the habit that might also distinguish these two plants but these are not given by Blume.

Blume's first description reads "ovarium oblongum, 1-loculare, 2-ovulatum, ovula pendula. Stigma sessile, obtusum. Drupa baccata umbilicata, nucleo 1-spermo." The second description which is in agreement with the plate accompanying it describes "ovarium conicum v. cylindricum, ad basin disco brevi annulari cinctum, uniloculare. Ovula 2, ex apice loculi pendula anatropa. Stigma terminale, simplex v. conicum sulcatum. Drupa baccata nucleo fibroso, monospermo." The fact that these two descriptions do not agree and can not represent the same plant is evident and important. If the name *Stemonurus* is applied to the plant described in Blume's original diagnosis a new name must be accepted for that described in his later diagnosis.

Plants which do agree with the first description (Plate I, figs. 7-15) are those related to *Stemonurus javanicus* or *Gomphandra javanica*. I have not been able to examine Blume's material but I have seen an isotype of *S.* or *G. axillaris*, *S. coriaceus* or *G. coriacea*, and *S. penangianus* or *G. penangiana* which subsequent authors have considered as congeneric if not synonymous with Blume's *S. javanicus*. Here the flowers are unisexual by abortion. The flowers which are functionally female have an oblong or cylindrical pistil (Pl. I, fig. 8) capped by a large ring of tissue. This ring has been regarded as glandular with a central portion functioning as a stigma. This interpretation seems quite correct for the "glandular" portion in the herbarium specimens has a different color and texture from the mass of the ovarian tissue. This glandular ring and the stigmatic portion enlarges as the flower matures and

becomes, soon after fertilization, almost twice the width of the ovary. Then as the fruit develops the ovary increases in width until the mature fruit is ovoid to cylindrical in shape and capped by this proportionally smaller and persistent glandular ring (Pl. I, fig. 7). Blume described this fruit as umbilicate in his first diagnosis due to the "carunculate" gland at its apex. The stamens in the pistil-bearing flowers in all the material I have examined are sterile. In the male flowers the stamens however develop pollen but here the pistil remains rudimentary. The general shape of this rudiment is usually depressed-conical, however it may assume many shapes and Miers has created several species using the form of these rudiments among his characters (Pl. I, figs. 14-15). These pistillate rudiments may however contain a single locule, at the apex of which is borne two rudimentary ovules. I am in agreement with Valetton (Crit. Overz. Olac. 213. 1886) in the belief that these never develop.

The second description published by Blume and the plate which accompanies it applies to a group of species centered around *Stemonurus* or *Urandra secundiflora* (Pl. I, figs. 1-6). Here the flowers are always perfect. The pistils of all flowers have an ovoid form tapering to a conical apex and terminated by a punctate stigma (Pl. I, fig. 2). The pistil in this group has at its base a thin membranaceous flap of the ovary wall completely surrounding the lower portion which can be aptly described as a "skirt." Upon maturing the pistil develops into a baccate, narrow-oblong drupe (Pl. I, fig. 1) which is tapered to an obtuse apex and base and as Thwaites points out (Enum. Pl. Zeyl. 43. 1858) "*drupa baccata, nucleo fibroso* does not apply to *Gomphandra* [*Stemonurus javanicus* or *G. javanica*] though it does to species figured in the Mus. Bot. Lugd. Bat." In contrast with the condition previously described this fruit lacks the terminal persistent glandular structure. Instead, the apex here is quite smooth. There is nothing in the form of this fruit which could be confused with that mentioned in the first description given by Blume. It is to be noticed that Blume's first description places weight on the fruit, there being a good description of that structure, but his second emphasizes the condition of the pistil. This change of emphasis, the omission of the word umbilicate, and the additional phrase describing the basal skirt in the two publications indicate that two forms are involved and that the name *Stemonurus* must be applied to the *S. javanicus* form.

The name *Gomphandra* which has been used by some authors in connection with the species here being discussed was first suggested by Wallich in Roxburgh's *Flora Indica* (2: 329. 1824). Wallich described a sec-

ond species of the genus *Lasianthera* and commented "I am very doubtful whether this can be considered as a species of the genus established by M. Palisot de Beauvois whose work quoted above I have not had access to. In the event of its proving distinct I would propose *Gomphandra* as the generic name for it." Its use here is, therefore, invalid being a provisional name. In his catalogue in 1831-2 Wallich again uses the name in two binomials, *G. axillaris*, and *G. penangiana*, (numbers 3718 and 7204). These are likewise invalid being nomina nuda. These binomials were subsequently validated in the appendix of the second English edition of Lindley's Natural System (p. 439) in 1836. These two Indian plants are congeneric with *S. javanicus* and consequently fall in *Stemonurus* as first described by Blume. Since the name *Gomphandra* which Wallich applied to these Indian species was not validated until 1836 that name must fall into synonymy of *Stemonurus* (1824).

This conclusion necessitates a new name for plants covered by the second diagnosis of Blume, that centering around *S. secundiflorus*. *Urandra* Thwaites (Hook. Kew Jour. Bot. 7: 211. 1855) is the only other name that has been applied to the complex of *S. secundiflorus*. In fact, *Urandra* appears to be the correct name for the complex. This application of the name has been used by Kuntze (Rev. Gen. 2: 113. 1891) and Engler (Nat. Pflanzenfam. III. 5: 248. 1893).

Several other names have been applied to this group of forms and should be briefly considered. Miers (Ann. Mag. Nat. Hist. ser. II, 10: 30. 1852) failed to distinguish between *Lasianthera*, *Stemonurus*, and *Urandra* and treated them as congeneric. The oldest name *Lasianthera* was rejected by Miers because of its grammatical construction. He therefore applied the next oldest name of *Stemonurus* to the complex that involved even forms of *Platea* and *Gonocaryum*. Differing from Miers, Miquel (Fl. Ind. Bat. 1¹: 790. 1856) refused to reject *Lasianthera*, though he applied the name to the same large complex of species. Thwaites (Enum. Pl. Zeyl. 44. 1858) described under the name *Platea* several species belonging to *Stemonurus*. Bentham and Hooker (Gen. Pl. 1: 350. 1862) correcting many of these errors segregated the complex, treated *Urandra* as a synonym of *Lasianthera* and applied the name *Gomphandra* to forms centering around *Stemonurus javanica*. Baillon (Hist. Pl. 5: 329. 1874) followed Miquel in his very broad definition of *Lasianthera*. Masters (Hook. f., Flora Brit. India 1: 584. 1875) and Alston (Trimen, Handb. Fl. Ceylon 6: 48. 1930) have followed Bentham and Hooker. Beccari (Mal. 1: 109. 1877) and Valetton (l.c.) use the names *Gomphandra* and *Stemonurus* for *Stemonurus javanicus* and *Urandra secundiflora* respectively. As has been explained the definition of *Stemonurus*

and *Urandra*, as accepted by Kuntze and followed by Engler is that here accepted by the present author.

New descriptions of these genera and a key distinguishing them from related genera have been prepared. Since so many species of this complex have been described, no attempt has been made in this paper to evaluate them. The forms now considered under the name *Urandra* are easily recognized from most descriptions but it is obvious to any investigator of this complex that the remainder of the species described belong to more than one genus. For that reason the generic description given for *Stemonurus* excludes the polypetalous species of *S. Merrittii*, *S. megacarpus*, and *S. lysipetalus* (Stapf) Merr. described under the name *Stemonurus* and restricts the genus to species having a tubular corolla with corolla tissue confluent and the petal sutures absent. A more complete treatment of the genus will be presented in a later paper.

***Urandra celebica* (Val.) comb. nov.**

Stemonurus celebicus Val. in Koorders, Meded. 'S Lands Plantent. **19**: 394. 1898.

***Urandra comosa* (King) comb. nov.**

Gomphandra comosa King, Jour. As. Soc. Beng. **64**²: 112. 1895.

***Urandra dolichophylla* (Merr.) comb. nov.**

Stemonurus dolichophyllus Merr. Univ. Calif. Publ. Bot. **15**: 171. 1929.

***Urandra evenia* (Stapf) comb. nov.**

Stemonurus evenius Stapf, Kew Bull. **1906**: 71.

***Stemonurus cambodianus* (Pierre ex Gagnep.) comb. nov.**

Gomphandra cambodiana Pierre ex Gagnep. Not. Syst. **1**: 199. 1910.

***Stemonurus dolichocarpus* (Merr.) comb. nov.**

Gomphandra dolichocarpa Merr. Pap. Mich. Acad. Sci. **23**: 183. 1937.

***Stemonurus fulgineus* (Elm.) comb. nov.**

Urandra fulginea Elm. Leaflet. Philip. Bot. **2**: 491. 1908.

Gomphandra fulginea (Elm.) Merr. Enum. Philip. Pl. **2**: 490. 1923.

***Stemonurus lancifolius* (Merr.) comb. nov.**

Gomphandra lancifolia Merr. Philip. Jour. Sci. **17**: 277. 1920.

***Stemonurus luzoniensis* (Merr.) comb. nov.**

Urandra luzoniensis Merr. Philip. Jour. Sci. Bot. **3**: 242. 1908.

Gomphandra luzoniensis (Merr.) Merr. Enum. Philip. Pl. **2**: 490. 1923.

***Stemonurus nyssifolius* (King) comb. nov.**

Gomphandra nyssifolia King, Jour. As. Soc. Beng. **64**²: 114. 1895.

Stemonurus oblongifolius (Merr.) comb. nov.

Gomphandra oblongifolia Merr. Philip. Jour. Sci. Bot. **17**: 276. 1920.

Stemonurus oppositifolius (Pierre ex Gagnep.) comb. nov.

Gomphandra oppositifolia Pierre ex Gagnep., Lecomte Not. Syst. **1**: 198. 1910.

Stemonurus salicifolius (Ridl.) comb. nov.

Gomphandra salicifolia Ridl. Jour. As. Soc. Straits Br. **82**: 176. 1920.

Stemonurus subrostratus (Merr.) comb. nov.

Gomphandra subrostrata Merr. Pap. Mich. Acad. Sci. **19**: 164. 1933.

Stemonurus Yatesii (Merr.) comb. nov.

Gomphandra Yatesii Merr. Pap. Mich. Acad. Sci. **19**: 165. 1934.

MEDUSANTHERA SEEMANN

Medusanthera Seemann, Jour. Bot. **2**: 74. 1864.

Stemonurus Seemann, Flora Vitiensis 39. 1865, in part.

Tylecarpus Engler, Nat. Pflanzenfam. III, **5**: 247. 1893; Lloyd and Aiken, Bull. Lloyd Lib. No. 33, Bot. Ser. **4**: 65, fig. 1934.

Lasianthera Becc. Mal. **1**: 108, tab. 3. 1877, in part.

Medusanthera vitiensis Seemann, Jour. Bot. **2**: 74. 1864.

Stemonurus Vitiensis (Seemann) Seemann, Fl. Vit. 39, pl. 12. 1865.

Gomphandra vitiensis (Seemann) Val. Crit. Overz. Olac. 230. 1886.

Lasianthera (St.) *Vitiensis* (Seem.) Becc. Mal. **1**: 108. 1877.

Medusanthera papuana (Becc.) comb. nov.

Lasianthera papuana Becc. Mal. **1**: 108, tab. 3. 1877.

Tylecarpus papuana (Becc.) Engler, Nat. Pflanzenfam. III. **5**: 247. 1893.

Medusanthera australis (C. T. White) comb. nov.

Tylecarpus australis White, Queensland Dept. Agric. Bull. **20**: 12, fig. 1918.

Medusanthera samoensis (Reinecke) comb. nov.

Tylecarpus samoensis Reinecke, Bot. Jahrb. **25**: 650. 1898; Lloyd and Aiken, Bull. Lloyd Lib. No. 33, Bot. Ser. **4**: 65, fig. 1934.

Medusanthera carolinensis (Kanehira) comb. nov.

Gomphandra carolinensis Kanehira Fl. Micron. 198, fig. 85. 1933, Bot. Mag. Tokyo **47**: 673. 1933.

Tylecarpus carolinensis (Kanehira) Kanehira and Hafusima, Bot. Mag. Tokyo **50**: 605. 1936.

Medusanthera glabra (Merr.) comb. nov.

Gomphandra glabra Merr. Philip. Jour. Sci. Bot. **17**: 277. 1920.

***Medusanthera laxiflora* (Miers) comb. nov.**

Stemonurus laxiflorus Miers, Ann. Mag. Nat. Hist. ser. II, 10: 111. 1852.

Platea laxiflora Miers, l.c. 111. 1852.

Gomphandra laxiflora (Miers) Rolfe, Jour. Bot. 23: 211. 1885.

Cissus flexuosa Turcz. Bull. Soc. Nat. Mosc. 31: 115. 1858; Planch. in D. C. Monog. Phan. 5: 624. 1887; Merr. Enum. Philip. Pl. 2: 420. 1923.

In his treatment of the Icacinaceae for the Natürlichen Pflanzenfamilien in 1893 Engler based a new genus, *Tylecarpus*, on the species *Lasianthera papuana* Becc. Since then three species have been added: *T. australis* C. T. White, *T. samoensis* Reinecke, and *T. carolinensis* (Kaneh.) Kanehira and Hatusima, the latter being a recent transfer from *Gomphandra*.

There is, however, an older name for the group. Seemann (1864) established the monotypic genus (*Medusanthera* for *M. vitiensis* from Fiji. He later referred it to *Stemonurus* in his Flora Vitiensis but since that time various authors have mentioned it and have not referred it with certainty to any particular genus. Beccari, in a foot-note (Mal. 1: 108. 1877) thought it might be a *Lasianthera*, with which this plant certainly has a superficial similarity in the fruits, and referred the species to that genus. Valetton disagreed and referred it to *Gomphandra*.

I have examined an isotype of *M. vitiensis* and find that while most authors in the past have regarded it as having hermaphroditic flowers they are actually unisexual. The type as figured by Seemann (Flora Vitiensis pl. 12. 1865-73) is a staminate example. Recent collections from Samoa (Gillespie 3517) have female flowers and very immature fruits. It is apparent that this plant represents the same group as *Tylecarpus papuana* (Becc.) Engl. and since the name *Medusanthera* is older it must replace the former.

The genus is easily recognized by its characteristic fruits but it also has a habit which permits it to be readily identified. The genus has unisexual flowers with the pistil in the male flowers usually small and conical. Although usually undifferentiated I have seen one example (*M. laxiflora*, Wenzel 2947) where a locule is present in this rudiment although there was not any indication of ovule development. In the female flowers the pistil is cylindrical with a gibbous fleshy mass on one side below the middle. The stigma is large and more or less conical, usually of a greater diameter than the ovary itself. This pistil is similar in form to that of *Stemonurus* which, however, lacks the basal gibbosity. The petals in both sexes of this plant are free, valvate, with an inflexed tip and are glabrous in all the examples I have seen. The axillary in-

florescence is quite typical and readily distinguishes the group; it is laxly cymose the branches being usually thin and delicate in flower but becoming thicker as the fruit matures. Compare the figures shown by Miers (Contrib. 1: plate 16) and by Beccari (Mal. 1: tab. 3). The flowers are articulated to the pedicel and usually occur in clusters of from 2 to 4. The fruit, as mentioned before, is characteristic resembling very much that of *Gastrolepis*, *Lasianthera*, or *Discophora*. At maturity it is curved and asymmetrical with a fleshy pad or appendage on the concave side, the same side which bears the gibbosity in the flowering condition. This appendage varies from slightly larger in width than the carpel itself (Becc. l.c. fig. 1) to over twice the width of the carpel (Lloyd and Aiken, Bull. Lloyd Lib. No. 33, Bot. Ser. 4: 65, fig. 1934). The development of this will be considered in a future paper. The leaves of the species are very similar in appearance and the group can be recognized on this basis. The veins and mid-rib are sulcate above, the margin is revolute, the texture is sub-coriaceous, the dorsal surface is usually dull, and the ventral surface is slightly lighter in color.

The known range includes Samoa, Caroline Islands, Fiji Islands, New Guinea, Australia, and the Philippines.

CITRONELLA D. Don

Citronella D. Don, Edinb. New Phil. Jour. 13: 243. 1832.

Villaresia Ruiz & Pavon, Fl. Peruv. Chil. 3: 9, t. 231. 1802; A. Jussieu, Ann. Sci. Nat. 25: 14, t. 3. 1832; not Ruiz & Pavon, Fl. Peruv. Chil. Prodr. 35. 1794.

Charicssa Miquel, Fl. Ind. Bat. 1^a: 794. 1856.

Pleuropetalon Blume, Mus. Bot. Lugd.-Bat. 1: 248. 1850.

Sarcanthidion Baillon, Adans. 11: 199. 1874.

Citronella costaricensis (Donn. Sm.) comb. nov.

Villaresia costaricensis Donn. Sm. Bot. Gaz. 31: 110. 1901.

Citronella Engleriana (Loesn.) comb. nov.

Villaresia Engleriana Loesn. Notizbl. Bot. Gard. Berlin 3: 20. 1900.

Citronella Gongonha (Mart.) comb. nov.

Cassine Gongonha Mart. Reise Bras. 1: 285. 1823; Travels Braz. 2: 100. 1824.

Ilex Gongonha D. Don in Lambert, Gen. Pinus, 2: app. 7**, t. 6. 1824.

Myginda Gongonha D.C. Prod. 2: 12. 1825.

Villaresia Gongonha Miers, Ann. Mag. Nat. Hist. Ser. III, 9: 112. 1862.

Villaresia pungens Miers, Ann. Mag. Nat. Hist. Ser. III, 9: 112. 1862.

Villaresia cuspidata Miers, Ann. Mag. Nat. His. Ser. III, 9: 113. 1862.

Villaresia Gongonha C. Muell. Walp. Ann. **8**: 569. 1872.

Villaresia mucronata sensu Reiss. in Mart. Fl. Bras. XII. **2**: 75, t. 22. 1872, not Ruiz & Pavon.

Villaresia mucronata sensu Sprague, Bot. Mag. **137**: t. 8376. 1911, not Ruiz & Pavon.

The specific epithet is derived from the vernacular name for this plant. Early authors seem to vary in their spelling of this, some use a "C" while others use a "G." All the specific names used regarding this plant in the literature, however, have been given as *Gongonha*. It was originally described as a *Cassine* and then as *Ilex* in the Aquifoliaceae, where it was considered related to *Ilex paraguariensis*, the true source of Maté. As St. Hilaire (Guillem. Arch. Bot. **1**: 31. 1833) points out, it is actually inferior to the tea produced from the species of *Ilex*, however.

All the references in current literature cite Miers as the author of the binomial, actually he was responsible only for the combination under *Villaresia* with a change in the spelling of the vernacular name.

Ruiz and Pavon (Syst. Veg. Fl. Peruv. Chil. **14**. 1798) refer this vernacular name to *Peperomia inaequalifolia* and spell it "Congonha."

Citronella incarum (Macbr.) comb. nov.

Briquetina incarum Macbride, Publ. Field Mus. Nat. Hist. Bot. Ser. **11**: 26. 1931.

Citronella latifolia (Merr.) comb. nov.

Villaresia latifolia Merr. Philip. Jour. Sci. Bot. **14**: 415. 1919.

Citronella megaphylla (Miers) comb. nov.

Villaresia megaphylla Miers, Ann. Mag. Nat. Hist. ser. 3, **9**: 114. 1862.

Villaresia citrifolia Borzi, Boll. Ort. Bot. Palermo **1**: 44. 1897.

Villaresia grandiflora Fisch. ex Regel, Gartenfl. **5**: 61. 1856, **6**: 1, t. 180. 1857, *V. grandifolia* on pl.

Villaresia grandifolia Fisch. & Mey. in sched. ex Mart. Fl. Bras. **12**: 54. 1872, as synonym of *V. megaphylla*.

The two articles in Gartenflora by Regel on the cultivation of a species of *Villaresia* apparently deal with the same plant. The plate accompanying the second, however, is labeled *V. grandifolia* while the article is entitled *V. grandiflora*. The plant is apparently synonymous with *Citronella megaphylla*, although the pistil is figured without pubescence, but the other characters are in agreement.

Citronella Moorei (F. v. Mueller ex Benth) comb. nov.

Villaresia Moorei F. v. Mueller ex Benth, Fl. Austral. **1**: 396. 1863.

Chariessa Moorei (F. v. Mueller) Engl. Nat. Pflanzenfam. III, **5**: 245. 1893.

Citronella mucronata (Ruiz & Pavon) D. Don, Edinb. Phil. Jour. **13**: 243. 1832.

Villaresia mucronata Ruiz & Pavon, Fl. Peruv. Chil. **3**: 9, t. 231. 1802;
A. Jussieu, Ann. Sci. Nat. **25**: 14, t. 3, fig. 2. 1832.

Villaresia chilensis (Mol.) Stuntz, U. S. Dept. Agric. Bur. Pl. Ind.
Invent. Seed Pl. Imp. **32**: 39. 1914, not *Citrus chilensis* Molina.

As far as I have been able to find Miers was the first to place *Citrus chilensis* Molina in the synonymy of *Citronella mucronata*. Stuntz in 1914 noticed the name of Molina was older and published the new combination, *Villaresia chilensis* (Mol.) Stuntz for this group. Molina's first account of his species hardly fits *Citronella*. It reads "Citrus chilensis is distinguished from the common orange by sessile leaves and oval fruits which are not larger than a hazelnut and of which the taste is the same. The wood of this tree which reaches a considerable height is sought by wood workers because of its yellow color." Surely if this plant had been a true *Citronella* with its dry drupaceous fruit Molina would have found some other differences than the mentioned sessile leaves and smaller fruit. His statement concerning the taste almost assures us he knew an orange and it is hard to believe he could consider a fruit of *Citronella* as comparable. In the second edition of his book Molina (1810) describes the stems as ascending and armed with short spines, this certainly isn't *Citronella mucronata*. Bertero 1829, refers to *Citrus chilensis* in the following manner. "It is no different from *Citrus aurantium* except for the size of all of its parts" and he believes it should be a variety. Gay fails to mention *Citrus chilensis* in his discussion of *Citronella mucronata*.

I am not at all convinced this species of Molina belongs in synonymy here and for that reason I choose to disregard Stuntz' combination and retain *mucronata* as the specific epithet.

The relation of this plant to the oranges which is frequently cited in the literature probably comes through its vernacular name of Naranjillo and through Ruiz and Pavon's statement that it looks like a "Citronnier."

Citronella paniculata (Mart.) comb. nov.

Leonia paniculata Mart. Flora **24**: Beibl. 26. 1841; D.C. Prod. **8**: 669. 1844.

Lereticia paniculata Mart. Fl. Bras. **7**: 17. 1856.

Villaresia paniculata (Mart.) Miers, Ann. Mag. Nat. Hist. ser. 3, **9**: 116. 1862.

Citronella paraguariensis (Hassler) comb. nov.

Villaresia paraguariensis Hassler, Repert. Spec. Nov. **14**: 164. 1915.

Citronella peruviana, sp. nov.

PLATE IV.

Arbor vel frutex(?); ramis teretibus glabris pallide brunneis; ramulis fulvo-hirsutis; foliis maturis late lanceolatis vel ellipticis coriaceis utrinque glabris 12-18 cm. longis et 5-8 cm. latis, apice anguste acutis, basi rotundatis vel obtusis plus minusve obliquis margine spinoso-dentatis (dentibus usque ad 2 mm. longis), supra in sicco cinereo-brunneis, subtus brunneis; costa prominente; venis primariis 5, supra leviter sulcatis, subtus prominentibus arcuatis laxè anastomosantibus, nervis secundariis prominulis; petiolis crassis 0.5-0.6 cm. longis; folius juventute margine sinuatis utrinque sparse fulvo-hirsutis; inflorescentiis axillaribus vel extra-axillaribus, immaturis ca. 8 cm. longis, flores sessiles gerentibus, ramulis racemose dispositis 5-10-floris recurvatis flavo-pilosis usque ad 1.5 cm. longis; calyce breviter campanulato, lobis laxè imbricatis ovatis obtusis praesertim apicem versus fulvo-pilosis, 2 mm. longis et latis; petalis oblongis margine sinuatis crassis carnosissimis laxè imbricatis glabris 5 mm. longis 2 mm. latis; staminibus 2.2-2.8 mm. longis, antheris oblongis vel ovatis, 0.5-0.8 mm. longis basi divergentibus, connectivo haud incrassato; filamentis ca. 2 mm. longis et latis basi valde dilatatis apicem versus attenuatis; ovario glabro, stylo sulcato 0.8 mm. longo, stigmate obliquo; fructu ignoto.

PERU: Dept. Junin, Rio de Comas, alt. 2400-2500 m. 1909-1914 *Weberbauer 6617*. (TYPE Gray Herbarium, ISOTYPES F.M., U.S.)

The plant described above resembles both *Briquetina* and *Villaresia* as these have been defined by recent authors. In its leaf texture and in the distinctive inflorescence it is closest to *C. incarum* from which it differs in the shape of the leaf and its spinose margins. Also the petals are about two-thirds the length of those of *C. incarum*. The inflorescences consist of racemously arranged cymes. The individuals cymes bear 5-10 sessile flowers and are characteristically recurved at maturity. Occasionally, the lower ones elongate to twice the length of the upper. The young leaves on terminal shoots have sinuate margins but the mature or older leaves have spinose margins. In this character it resembles *C. mucronata* or *C. Gongonha* which have spinose margined leaves on sucker or vigorous shoots. Possibly there may be similar variation in *Citronella peruviana*.

Citronella philippinensis (Merr.) comb. nov.

Villaresia philippinensis Merr. Philip. Jour. Sci. Bot. 14: 414. 1919.

Citronella ramiflora (Miers) comb. nov.

Villaresia ramiflora Miers, Ann. Mag. Nat. Hist. ser. 3, 9: 116. 1862.

Citronella samoensis (A. Gray) comb. nov.

Pleuropetalon Samoense A. Gray, U. S. Explor. Exped. Bot. Phan. **1**: 299, pl. 27. 1854.

Chariessa samoensis (A. Gray) Engler, Nat. Pflanzenfam. III, **5**: 245. 1893.

Villaresia Samoense (A. Gray) Val. Crit. Overz. Olac. 199. 1886.

Citronella sarmentosa (Baill.) comb. nov.

Sarcanthidion sarmentosum Baill. Adans. **11**: 199. 1874.

Citronella Smythii (F. v. Muell.) comb. nov.

Villaresia Smythii F. v. Mueller, Frag. **5**: 156. 1866.

Chariessa Smythii (F. v. Muell.) Becc. Mal. **1**: 118. 1877.

Villaresia adenophylla Domin, Bibliot. Bot. **89**: 50. 1921.

I have not seen Domin's material but there seems to be no reason for retaining this as a distinct species since it is in agreement in all characters with *Citronella Smythii*.

Citronella suaveolens (Blume) comb. nov.

Pleuropetalon suaveolens Blume, Mus. Bot. Lugd.-Bat. **1**: 248. 1850.

Chariessa suaveolens (Bl.) Miq. Fl. Ind. Bat. **1**: 794. 1856.

Villaresia suaveolens (Bl.) Val. Crit. Overz. Olac. 199. 1886.

Citronella virescens (Miers) comb. nov.

Villaresia virescens Miers, Ann. Mag. Nat. Hist. ser. 3, **9**: 115. 1862.

The species to which Ruiz and Pavon originally applied the name *Villaresia* is a very different plant from that which bears the name today. *Villaresia* was described in Prod. Fl. Peru and Chili in 1794 with the species *V. emarginata* being listed in the Syst. Fl. Peruv. Chil. in 1798. The original description concerns a plant with a sessile stigma, an oblong acuminate 2-valved 1-seeded capsule with an oblong tetragonal seed surrounded by a fleshy arillus. This is obviously different from the plants of the Icacinaceae which currently bear that name. This latter can be described as having the style evident, filiform to stout; fruit a globular drupe, indehiscent, putamen with a vertical partition extending inward half the diameter of the mature locule, the seed curved around this appearing hippocrepiform in section, no fleshy arillus present.

In the third volume of Flora peruviana et chilensis (1802) Ruiz and Pavon describe and give a plate illustrating the second species of their genus, *V. mucronata*, which is the basis of the present concept of the genus. This is quite a different plant from that indicated in the original publication. A. Jussieu (Ann. Sci. Nat. **25**: 14. 1825) was the first to notice this discrepancy, commenting that the first description is different and inexact. He accepted the name *Villaresia*, however, for the

icacinaceous genus. D. Don (Edinb. New Phil. Jour. **13**: 243. 1832) insisting that the name *Villaresia* should be applied to the apparently celastraceous plant originally described, coined a new name, *Citronella*, for the icacinaceous plant which Jussieu and most subsequent botanists have called *Villaresia*. The name *Citronella* was suggested by a Chilean vernacular name for *V. mucronata* R. & P. The original description of *Villaresia* in R. & P. Prodrum has no illustration though most other genera described are figured. Don suggests that the specimens and the plate of the original plant were lost in the shipwreck of the San Pedro de Alcantara. The name *Citronella* was not taken up by later authors and has since been carried in synonymy, though it is the oldest available name for this genus.

Another name applying to the icacinaceous genus is *Pleuropetalon* which was published by Blume in Mus. Bot. Lugd.-Bat. in 1850. Asa Gray described a second species, *P. samoense*, in 1854 noting then its superficial affinities with *Bursinopetalum* and *Villaresia*. *Pleuropetalon* of Blume is antedated by *Pleuropetalum* Hook. f. of the Portulacaceae which was established in 1845. In 1855, Miquel, for this reason, changed Blume's name to *Chariessa*. Bentham and Mueller recognizing their similarities combined *Villaresia* and *Chariessa*. Beccari distinguished between them but Valetton reunited them. Engler distinguishes between the two genera on weak characters which I do not consider of value, that is the corolla imbricated in *Villaresia* and valvate in *Chariessa*, this condition will be discussed later. Since 1893, Merrill and Domin have combined the two genera under the name *Villaresia*. It appears to me that their similarities are so much stronger and of more importance than their very slight differences, that it is advisable to consider them as congeneric. This conclusion is supported by consideration of the intermediate form of two other genera which are related here.

Briquetina was proposed by Macbride in 1931 and is to be referred to this complex. This form is intermediate in several ways between the Old World group of *Chariessa* and the New World forms of *Villaresia*. In *Citronella peruviana* Howard (Plate IV) the inflorescence is intermediate and the leaves which are large as in *Briquetina incarum* and have a spinose margin which has been troublesome to past workers in the South American species of *Villaresia*.

Sarcanthidion Baillon must also be referred to this group. This plant is known only from New Caledonia and has a sarmentose or climbing habit which has been used to set it apart from the other genera here considered, although Baillon did recognize its affinities with *Villaresia*. Engler distinguishes it by the curved style and a capitate instead of

oblique stigma, nevertheless both of these characters are found in *Citronella* as a whole. Valetton places the two genera side by side but fails to comment on them beyond recognizing their similarities. In the structure of the flower, and the wood this genus is indistinguishable from *Citronella* and likewise has the characteristic ovary and inflorescence which easily separates this group from the rest of the Icacinaceae.

Another form worthy of mention is *Citronella costaricensis* (Donn. Sm.) Howard which was originally described as a *Villaresia*. Its inflorescence approaches that found in *Briquetina incarum*; its leaves are more nearly like those of *Citronella paniculata* and *Citronella megaphylla* and in its wood-structure it has certain peculiarities which are commonly found in the Old World species of *Chariessa*. The range is new world and thus the species serves as another example of a plant with intermediate characters which supports the consideration of these genera as one large group under the name *Citronella*, the oldest valid name.

The fruit of this genus contains its most interesting and distinctive character. In the pistil the funiculus runs up the inside of the locule appearing as a ridge protruding into the space. The two ovules are pendant from near the apex, one on each side of this ridge. (Plate IV, fig. 6-7.) When the fruit matures the ridge enlarges and forms a radial partition extending half the diameter of the locule and running vertically. Miers called this ridge a dissepiment since he believed it was formed through the abortion of one or more extra locules. He considered the genus as belonging in the Aquifoliaceae and therefore a continuation of the tendency in that family to reduce the carpellary number of the flower. Miers also found a pistil with two locules which he regarded as support to his conclusion. Valetton, contrarily does not regard this as formed through abortive carpels. He found this ridge to contain vascular strands and so to be of independent origin from any loss of carpels. To this ridge he applied the term "richel." Only one of the two ovules in the pistil of the Icacinaceae develops and in the fruit the seed is curved around the partition. Thus in a cross section the seed appears to be hippocrepiform. While this fruit and seed shape are distinctive and diagnostic for the genus *Citronella* of the Icacinaceae, instances of similar characters have been reported in other families. Miers (Ann. Mag. Nat. Hist. ser. 3, **9**: 108. 1862) and A. Jussieu (Ann. Sci. Nat. **25**: 14. 1832) and others have considered these in detail. The one I have found most often confused in the herbarium, however, is *Bursinopetalum* or *Mastixia* of the Cornaceae which has this same projection of the endocarp or putamen into the locule. This is easily distinguished however by its perigynous flowers and inferior fruit. The

comparison is often made with the condition found in the Menispermaceae, however the situations in these two groups are not strictly similar. In the Menispermaceae as A. Jussieu (l.c.) points out the entire seed and embryo are curved upon a horizontal plane with the partition thus formed running horizontally instead of vertically and so are easily distinguished from the genus *Citronella*.

A second peculiarity of the genus *Citronella* is the aestivation of the corolla. (cf. Plate IV, fig. 3, 5.) The petals are free, very fleshy for the family and with a strongly protruding mid-rib. The apex of the petals is inflexed and the top of the bud shows all five petals at its depressed center. The margins of these petals, however, are usually membranaceous, not at all fleshy as at their centers, and overlap. For this reason the petals have been regarded as imbricated. A. Gray (U. S. Explor. Exped. Bot. Phan. 1: 301. 1854) calls this condition a mixture of the two forms since the petals at their bases are valvate abutting each other or often separated. Although the petals overlap at the margins and especially so at the shoulders or curve of the corolla in bud condition I believe the condition to be a modified valvate aestivation rather than an imbricated one. I know of no example where the corolla, regarded as truly imbricated has the apices of the petals free and inflexed as they are here. Usually in an imbricated condition the apices too overlap. Engler's key distinction, that the old world *Chariessa* forms are valvate in contrast with the remainder of the forms is not exact and can not be used. The amount of overlapping of the margins of the petals is variable and flower buds on the same inflorescence show all degrees of this.

The leaves of this genus, particularly several of the new world species, may have their margins spinose. Miers (Ann. Mag. Nat. Hist. ser. 3, 9: 112. 1862) described *Villaresia pungens* from a specimen of this sort. Many of the collections I have examined have both types of leaves on the same sheet. Apparently the plant develops spinose margined leaves on the young or sucker shoots. Sprague, (Bot. Mag. t. 8376. 1911) in his plate labeled *Villaresia mucronata*, which is really *Citronella Gongonha*, also shows variations of this type which exist on the same tree in cultivation. It is likewise apparent that the distinctions used to separate *C. Gongonha* and *C. cuspidata* on the basis of entire or spinose-margined leaves is not acceptable, especially since many leaves with one or two spines on the margins are to be found. I regard these two species as synonymous. The case of *C. peruviana* has already been mentioned.

The leaves of several of the South American forms of *Citronella* bear small cavities in the axils of the veins on the ventral side of the leaf.